Investigation of [illegible] in Sands of Maryland, [illegible]

[illegible]

[illegible]

Submitted to the

Board of University Studies

of the

Johns Hopkins University

for the

Degree of Doctor of Philosophy

by

Charles Edward Chapman.

1910.

[illegible]

[illegible] at [illegible] would [illegible] interest [illegible] be for [illegible] laboratory. [illegible] Doctors [illegible] received at their [illegible].

[illegible] of [illegible] California [illegible] $C_{22}H_{22}$ [illegible] called [illegible] exceptions [illegible] of the fatty acid [illegible] in nature which contain an [illegible] The new acid differs quite [illegible] from the [illegible] undecylic acid, $C_{11}H_{22}O_2$ obtained by [illegible]. However, very little is known about [illegible] no work has been done on its other [illegible] the article referred to above.

[illegible] since the Lindera Benzoin belongs to the [illegible] family as the California bay tree, it [illegible] a homologue of lauric acid or some acid closely related to it, and it was [illegible] this possibility in mind that [illegible] was undertaken.

While it was not [illegible] to isolate undecylic acid or indeed any [illegible] compound with an uneven number of carbon atoms, nevertheless some very interesting results have been obtained.

(1) [illegible] Amer. Chem. Jour. [illegible], 276.

[illegible], [illegible] of oil [illegible] -ceous [illegible] weight of [illegible] numerous [illegible] in dark [illegible] generally used [illegible] as a remedy [illegible] odor of spi-ce [illegible] parts.(1)

The oil [illegible] odor of wintergreen, [illegible] the specific gravity [illegible] of methyl salicylate. [illegible] contains about 4 per cent of an oil [illegible] odor, the specific gravity [illegible] - [illegible] oils from 160° - 270°. [illegible] cent of an oil having the [illegible] and the specific gravity [illegible].

In [illegible] oil from the berries has been [illegible] neighborhood of Baltimore, where the [illegible]. The berries ripen in the middle or latter part of September, and must be gathered very soon after they ripen, otherwise they will fall to the ground and be lost in the undergrowth.

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(1) Report of Schimmel & Co., Oct. 1[illegible], [illegible] and Oct. 189[illegible], 49

hen [illegible] the berries have a [illegible]t red color, are oval
i[illegible] are [illegible] half [illegible] long. [illegible] half bushel
of t[illegible] [illegible] They [illegible] and
[illegible] pull the outer
[illegible] run then
[illegible] entirely
[illegible] allowed to
[illegible]

[illegible] ; first,
the ex[illegible] second,
[illegible] was found
i[illegible] is drive-
[illegible]

[illegible]

[illegible] concerned [illegible] pounds [illegible] from the [illegible] subjected to [illegible] amount of oil [illegible] vorous [illegible] distilla- [illegible] amount of vol- [illegible] sible to [illegible] at hand [illegible] required to that [illegible] water [illegible] complete the examination [illegible]

A quantitative [illegible] oil contained in the seeds [illegible] 3.[illegible] grams seeds yielded 1.[illegible] grams oil [illegible] to 38.19 per cent. This result [illegible] because it was impossible to prevent [illegible] of the finely divided pulp from filtering through the paper thimble of the Soxhlet extractor, and this pulp was then weighed

[illegible] sub-
[illegible] material
[illegible] was
[illegible] be [illegible]
[illegible] it was
[illegible] the second
[illegible] it would
[illegible] extracted all
[illegible] to moisten
[illegible] the mass i.
[illegible] would have
[illegible] about 60
[illegible] Dodes-
[illegible] ex-
[illegible] to
[illegible] and then ex-
[illegible] oil
from 40 - 50 [illegible] after [illegible] other
the extracted and expressed oils were distilled with
steam for several hours, but the amount of volatile oil

[illegible] 17.31 c.c.

[illegible] 77.31 - 4.57 = 17.74 c.c. [illegible] for saponifi[illegible]

1 c.c. alkali contai[illegible] .7078 gm. caustic potash

∴ 1.9311 grams fat require for saponification .5422

[illegible] grams [illegible] 4 milli-
[illegible]

[illegible] e
[illegible]

[illegible] have deter-
[illegible] alcohol
[illegible] dissolved
[illegible] dilute sul-
[illegible] mixture
[illegible] were ob-
[illegible] then fil-
[illegible] phe-
[illegible] alkali re-
[illegible] weight of
[illegible] of fat
[illegible] utilize
[illegible] 4 hr. Hence
[illegible] tion gave
[illegible]

[illegible] of volatile
[illegible] acid [illegible] be very small,
[illegible] doubtless consist [illegible] of capric
acid, $C_{10}H_{20}O_2$, which was taken from [illegible] fat as the
glyceride, and which is volatile with [illegible] slightly
soluble in water.

[illegible] this [illegible] has [illegible] tion of [illegible] and [illegible] off, [illegible] and over [illegible] ed the following results.

[illegible] $b S_4$

[illegible] $b S_4$

[illegible] 12 23 2 2

[illegible] illi- [illegible] the following results:

[illegible] 4

[illegible] 4

Calculate for [illegible]

[illegible]

[illegible]

[illegible] above

[illegible] to

[illegible] it is

[illegible] boiled

[illegible] dissolved and

[illegible] there

[illegible] 4

[illegible]

[illegible]

25.0

[illegible]

4

12 23 2 2 11 24 2 2 10 19 2 2

4

10 19 2 2

4

[illegible]

[illegible]

[illegible]

11 21 2 2

[illegible] of the [illegible] barium nitrate [illegible] chlorate, and [illegible] called a [illegible] nitrate, and did [illegible] insolubil-[illegible]

[illegible] the salts [illegible] results [illegible] and lead [illegible] of barium [illegible] lead and [illegible] very [illegible] are so much [illegible] as well as [illegible]

[illegible] barium salt [illegible] of [illegible] not order [illegible] the pure [illegible] in [illegible] required to dissolve [illegible] salts. Hence it was thought best to saponify the fat, liberate the free

[illegible] subjected to fractional distillation under [illegible] pressure [illegible] it is possible to [illegible]

[illegible] alcoholic [illegible] liter). [illegible] tified [illegible] which [illegible] oils together [illegible] present in the [illegible] residue [illegible] this [illegible] of [illegible] temp- [illegible] The [illegible] surface. [illegible] which could [illegible]

[illegible] This [illegible] potassium [illegible] The [illegible] alcohol, [illegible] the alcoholic solution [illegible] examined for glycerol. The [illegible] to twelve hours [illegible]

10 14 2 2

12 13 2 2

10 19 2 2

10 19 2 2 12 25 2 2

10 19 2 2

12 23 2 2

11 22 2

11 22 2

[illegible] some [illegible] the [illegible] e unsatu- [illegible] l fat. [illegible] s obtained, [illegible] t solidi- [illegible] very ag- [illegible] to which [illegible] the melt- [illegible] ulro- [illegible] line [illegible] acid, was [illegible] chloride and filtered out. [illegible] solid [illegible] acid. [illegible] line precipitate separated out, which upon sulphur [illegible] the following results.

[illegible]

[illegible]

18 33 2 2

[illegible] is oleic [illegible] oil [illegible] other [illegible] is con- [illegible] oleate is [illegible] uated [illegible] of the [illegible] eous solution [illegible] creamy [illegible] was filtered [illegible]. To was [illegible] solu- [illegible] was [illegible] ired as a [illegible] to yellow liquid. [illegible] is shown the following results.

(1) [illegible] d [illegible], 19

4

4

18 33 1 2

20.75

acids

leave

origi-

eet su-

ilrate

ardonic,

residue was

This al-

ional. The

which

, which

traces of

heated

acid po-

value o

ed

above

ional was alcohol

[illegible] is clear from the results that even the [illegible] of the [illegible] groups of [illegible] [illegible] [illegible]

Part II

[illegible] TYPE.

[illegible]

[illegible]

[illegible] Chevreul's [illegible] saponify- [illegible] and called it [illegible] worked melted [illegible] lauric acid from the [illegible] for [illegible] America by [illegible] acid [illegible] 43°. A few years later [illegible] investigation of co- [illegible] lauric acid. Cupric [illegible] and he separated [illegible] crystallization of their [illegible] lauric acid very much as [illegible] acid is melted at 42°- 43°. [illegible] lauric acid which melted at 43.6° from [illegible] 1861, [illegible] found lauric acid as a constituent of [illegible] obtained from the Cylicodaphne cebifera of Java. [illegible] in 1863

(1) Ann. 41, 29. (2) [illegible] 53, 500. (3) [illegible] 66, 290.
(4) [illegible] 92, 334. (5) Zeit. f. Chem. [illegible] 7, 256
(6) Jour. f. prak. Chem. [illegible], 236.

[illegible]

11 23

[illegible] (1) [illegible]

[illegible] or are

[illegible] 1 [illegible]

[illegible] lorbine

[illegible] Latter

[illegible] Ebbus

[illegible] tory

[illegible] 1, it was

[illegible] ure and

[illegible] analyti-

[illegible] 1.

[illegible] 1.

11 23

[illegible]

[illegible] i [illegible]

air. [illegible]

(1) Ber. d. Chem. Gesell. 31, 2314.

[illegible]

[illegible] 23 [illegible] 2

[illegible] to the [illegible] reco[illegible] used [illegible] added [illegible] demonstrated [illegible] level. The [illegible] it is insolu- [illegible] from [illegible] retained [illegible] the corre- [illegible] when [illegible] lustre. [illegible]

[illegible] 2 [illegible]

[illegible] 2 [illegible]

(1) [illegible]
(2) [illegible]

[illegible]

// 23 [illegible] 2

[illegible]

// 23 [illegible] 2

[illegible]

[illegible] daily once

[illegible] d [illegible] rified

[illegible]

// 23 [illegible] 6 5

[illegible]

(1) [illegible]

11 23 6 5

11 23 6 4 3

11 23 6 4 3

[illegible]

12 23 2 2

[illegible] coil-
[illegible] ml and a
[illegible] alco-
[illegible] solutions
[illegible] by con-
[illegible] another
[illegible] the resu-
[illegible] ies.
[illegible] and
[illegible] TS
[illegible]
[illegible]
[illegible]

12 23 2 2

[illegible] 25.64 [illegible]

[illegible] [1] [illegible] es [illegible] a [illegible] [illegible] [illegible] crystalline.

[illegible]

$[illegible]_{12} [illegible]_{23} [illegible]_{2} [illegible]_{2}$

[illegible] [illegible] [illegible] [illegible] boiling so- [illegible] [illegible] [illegible] [illegible] a boil- [illegible] [illegible] [illegible] [illegible] alcohol. [illegible] [illegible] [illegible] [illegible] [illegible] white [illegible] [illegible] [illegible] [illegible] the [illegible] [illegible] [illegible] [illegible] is [illegible] [illegible] [illegible] nearly as in- [illegible] [illegible] [illegible] [illegible] melting at [illegible] [illegible] [illegible] [illegible] of crys- [illegible].

I. [illegible] $[illegible]_2[illegible]$.

II. [illegible] $[illegible]_2$

[illegible] [illegible]

$[illegible]_{12}[illegible]_{23}[illegible]_{2}[illegible]_{2}O$ [illegible]

$[illegible]_2$ 3.5[illegible] [illegible] [illegible]

I. [illegible].2101 [illegible] of [illegible] [illegible] salt [illegible] [illegible] $[illegible]SO_4$.

II. [illegible].2100 [illegible] of [illegible] salt [illegible] 0.[illegible] $[illegible]SO_4$

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(1) [illegible] f. [illegible] [illegible], 206.

[illegible]

[illegible]

[illegible]

Calculated for Found

$Mg(C_{12}H_{23}O_2)_2$ I II

Mg [illegible] [illegible] [illegible]

[illegible]

$Mg(C_{12}H_{23}O_2)_2 \cdot C_{12}H_{24}O_2$

[illegible] alcoholic [illegible] alcoholic [illegible] that the [illegible] two in- [illegible] is impossible [illegible] magnesium form- [illegible] The salt [illegible] salts of lauric acid [illegible] the exception of [illegible] and sodium laurates. It crystallizes out of [illegible] alcohol in very fine white [illegible] 14 - [illegible] Analyses for magnesium [illegible]

(1) [illegible] O_4.

(2) [illegible] O_4.

Calculated for. Found.

$Mg(C_{12}H_{23}O_2)_2 \cdot C_{12}H_{24}O_2$ [illegible]

Mg [illegible] [illegible] [illegible]

[illegible][1] describes the normal magnesium laurate, $Mg(C_{12}H_{23}O_2)_2$, and said it contained [illegible] molecules of

---

[1] Loc. cit.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

(1) [illegible]

[illegible]

[illegible] (e-
[illegible] as
[illegible] order.
[illegible] soluble
in [illegible] and fi-
[illegible] mer
[illegible]

[illegible]

[illegible]

[illegible]

[illegible] $(C_6H_5O)_2$,
[illegible] crystal-
sil[illegible]

[illegible]

[illegible]

[illegible] similar [illegible] color.
It is insoluble in [illegible], [illegible] from
alcohol. It crystallizes in [illegible] which

(1) loc. cit.

[illegible]

[illegible]

$(C_{12}H_{23}O_2)_2$

[illegible]

$(C_{12}H_{23}O_2)_2$

[illegible] silver salts [illegible] in alcohol [illegible] pale [illegible] salts [illegible] 760° [illegible] contain [illegible]

[illegible]

Calculated for		
$(C_{12}H_{23}O_2)_2$	[illegible]	[illegible]
[illegible] 12.10	11.07	11.11

Biographical Note.

The author of this dissertation was born in Baltimore, Maryland, on the 9th of April 1875. His early education was obtained in the public schools of Baltimore, and he graduated from the Baltimore City College in 1893. In the fall of 1893 he entered the Johns Hopkins University and after pursuing the physical-chemical course obtained the degree of Bachelor of Arts in June, 1896. Since the fall of 1896 he has been doing graduate work in Chemistry as a major subject, in Geology as a first subordinate and in Mineralogy as a second subordinate. During his residence at Hopkins he has held an ordinary Hopkins scholarship and a University scholarship. In the spring of 1899 he was appointed to a fellowship in Chemistry which he resigned in order to become Professor Remsen's assistant.